

## Countermeasures for Treatment

Medication	Administered for Isotopes	Route of Administration & Dosage	Duration
Aluminum hydroxide <sup>1</sup>	Strontium-90	<b>PO:</b> 60-100 mL	Once
Aluminum phosphate gel <sup>1</sup>	Strontium-90	<b>PO:</b> 100 mL immediately after exposure	Once
Ammonium chloride <sup>1 3</sup>	Strontium-90, Radium-226	<b>PO:</b> 1-2 g q.i.d	6 days
Calcium <sup>1</sup>	Strontium-90, Radium-226	<b>PO:</b> Generous doses	
Ca-DTPA <sup>2</sup> , Zn-DTPA <sup>2</sup>	Plutonium-239, Americium-241, Curium-244, Californium-252 <sup>7</sup> , Thorium-232 <sup>7</sup> , Yttrium-90 <sup>7</sup>	<b>IV:</b> 1 g in 250 mL NS or 5% glucose, given in 1-2 h, or bolus over 3-4 min  <b>Inhalation:</b> 1g in 1:1 dilution with water or NS over 15-20 min  <b>IM:</b> 1 g; not recommended because of pain	Up to 5 days
Calcium gluconate <sup>1</sup>	Strontium-90, Radium-226	<b>IV:</b> 5 ampules (500 mg calcium each) in 500 mL D5W over 4 h	6 days
Dimercaprol <sup>1 4</sup>	Mercury, Lead, Arsenic, Gold, Polonium-210	<b>IM:</b> 300 mg/vial for deep IM use, 2.5 mg/kg (or less) q4h x 2 days, then bid for 1 day, then qd for days 5-10	10 days
D-Penicillamine <sup>1 5</sup>	Copper, Iron, Mercury, Lead, Gold, and possibly other heavy metals	<b>PO:</b> 250 mg, qd between meals & at bedtime. May increase to 4 or 5 g qd in divided doses.	

Potassium iodide <sup>2</sup>	Iodine-131	<b>PO:</b> <b>Adults &gt;40 years of age:</b> with thyroid exposure > 500 cGy: 130 mg/d  <b>Adults 18-40 years of age:</b> with thyroid exposure > 50 cGy: 130 mg/d  <b>Pregnant or lactating women:</b> 130 mg/d  <b>Children and adolescents 3-18:</b> with thyroid exposure > 5 cGy: 65 mg/d  <b>Infants 1 month to 3 years:</b> 32.5 mg/d  <b>Neonates from birth to 1 month:</b> 16 mg/d (See details)	* In some incidents only a single dose of KI is required.  * Incident Managers may recommend additional daily doses if radioactive iodine ingestion (or inhalation) is a continuing threat.  * In some incidents, a course of 7-14 days may be recommended.
Potassium phosphate, dibasic <sup>1</sup>	Phosphorus-32	<b>PO:</b> 250 mg phosphorus per tablet.  <b>Adult:</b> 1-2 tabs p.o. qid, with full glass of water each time, with meals and at bedtime.  <b>Children over 4y:</b> 1 tab qid.	
Propylthiouracil <sup>1 6</sup>	Iodine-131	<b>PO:</b> 50 mg tabs, 2 tid x 8 days	8 days

Prussian blue <sup>2</sup>	Cesium-137, Thallium-201	<b>PO (Adults):</b> 1 g tid with 100-200 mL water, up to 10 g/d  <b>Children:</b> * Not FDA approved for children under 2 years old ( <a href="#">EUA</a> required)  * Pediatric details in <a href="#">package insert</a>	≥3 weeks, titrated by urine and fecal bioassay and whole-body counting
Sodium alginate <sup>1</sup>	Strontium-90, Radium-226	<b>PO:</b> 10 g powder in a 30 cc vial, add water and drink	
Sodium bicarbonate <sup>1</sup>	Uranium-235	<b>IV:</b> * 2 ampules sodium bicarbonate (44.3 meq each, 7.5%) in 1000 mL NS, 125 mL/h, or  * 1 ampule of sodium bicarbonate (44.3 meq, 7.5%) in 500 mL NS, 500 mL/h  <b>PO:</b> 2 tablets every 4 h until urine pH=7-8, or 4 g (8 tablets) 3 tid	* Usually IV for the first 24 h, PO for additional 2 days;  * Continuation of treatment for >3 days is rare and can be done according to titration of uranium amounts in the body
Sodium phosphate <sup>1</sup>	Phosphorus-32	See Potassium phosphate	
Water <sup>1</sup>	Tritium (H-3)	<b>PO:</b> > 3-4 L per day	3 weeks

## NOTES

1. Drug listed is not approved by the FDA for this indication / Off label use
2. FDA approved for this indication
3. FDA Product Safety Information:
  - Oral dosing of ammonium chloride is suggested for the use of radium and strontium internal contamination; however, this indication is not approved, there is currently no approved oral dosage form, and the commercial availability of the oral dosage form is not known.

- Ammonium chloride may be contraindicated in patients with impaired hepatic or renal function.
4. FDA Product Safety Information:
    - Adverse events have been reported following use of dimercaprol.
    - Use of dimercaprol has been considered in the most severe cases of polonium contamination due to potential toxicity.
  5. FDA Product Safety Information:
    - Adverse events has been reported following use of penicillamine, including neutropenia, thrombocytopenia, and nephrotoxicity.
    - Use of penicillamine has been considered in the most severe cases of cobalt contamination due to potential toxicity.
  6. FDA Product Safety Information:
    - When KI is unavailable or contraindicated, propylthiouracil and methimazole may be used for blocking thyroid uptake of radioiodine.
    - The potential for granulocytopenia and agranulocytosis is significant.
  7. Ca-DTPA/Zn-DTPA has not been approved by FDA for treating contamination with californium, thorium, and yttrium